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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,948	03/05/2002	Hiromi Nakanishi	33035M086	5371
441	7590	06/27/2005	EXAMINER	
SMITH, GAMBRELL & RUSSELL, LLP			WANG, QUAN ZHEN	
1850 M STREET, N.W., SUITE 800				
WASHINGTON, DC 20036			ART UNIT	PAPER NUMBER
			2633	

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/087,948

Applicant(s)

NAKANISHI ET AL.

Examiner

Quan-Zhen Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-69 is/are pending in the application.
- 4a) Of the above claim(s) 16-30 and 44-59 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 31-36 and 60-62 is/are rejected.
- 7) ☒ Claim(s) 8-14, 37-43, 63-66 and 67-69 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/5/02.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Species I in the reply filed on 4/13/2005 is acknowledged.

Claims 15-30, 44-59, and 66 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species II and III, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 4/13/2005.

Claims 1-14, 31-43, 60-65, and 67-69 are examined.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. Patent US 6,527,458 B2) in view of Tziviskos et al. (U.S. Patent US 6,411,854 B1).

Regarding claim 1, Kim teaches an optical communication device (figs. 5-6; figs. 2-4) comprising: a circuit board (fig. 5A, 141) having a top surface and a bottom surface (inherent); a bench (fig. 5A, 142) mounted on the top surface of the circuit board; optoelectronic elements mounted on the bench and having operation for generating or

receiving signal light (fig. 2, PD 112 and LD 115); light guides (fig. 2, fiber 116) for guiding the signal light from or into the optoelectronic elements; and electronic or electric elements mounted on the circuit board for realizing the operation of the optoelectronic elements (column 2, lines 54-65). The device of Kim differs from the claimed invention in that Kim does not specifically teach that the electronic or electric elements mounted on the bottom surface and on the top surface of the circuit board. However, it is a common sense to mount electronic or electric elements mounted on both the bottom surface and the top surface of a circuit board. For example, Tziviskos mount electronic or electric elements on both the bottom surface and the top surface of a circuit board (fig. 3). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to mount the electronic or electric elements on both the bottom surface and the top surface of the circuit board, as it is done by Tziviskos, in the device of Kim in order to reduce the size of the circuit board.

Regarding claim 2, Kim further teaches that the optoelectronic elements on the bench include optoelectronic chips for generating light signals or for monitoring the generated light (fig. 3, monitoring PD 123), and the bench aligns the light guide to the optoelectronic chip (column 4, lines 54-64).

Regarding claim 3, Kim further teaches that wherein the optoelectronic chips for generating light signals or for monitoring the generated light are one or two of a photodiode (PD), a laser diode (LD) and a light emitting diode (LED) (fig. 3).

Regarding claim 4, Kim further teaches that the light guide is an optical fiber and a ferrule supported on the bench (fig. 4, 144).

Regarding claim 5, the device of Kim differs from the claimed invention in that Kim does not specifically teach that the light guide is a waveguide made on the bench. However, Examiner takes Official Notice that it is well known in the art to use a waveguide made on a bench as a light guide. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to make a waveguide on the bench in the device of Kim to guide the light in order to simplify the assembly process of the device.

Regarding claim 6, Kim further teaches that the bench is a silicon bench (abstract). The device of Kim differs from the claimed invention in that Kim does not specifically teach that the bench is a single crystal silicon bench. However, examiner takes Official Notice that it is well known in the art to use a single crystal silicon for an optical bench. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use a single crystal silicon for the optical bench in the device of Kim in order to etch the bench to produce a V-shaped grooves for the light guide (column 6, lines 32-36).

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. Patent US 6,527,458 B2) in view of Tziviskos et al. (U.S. Patent US 6,411,854 B1) and further in view of Galeotti et al. (U.S. Patent US 6,712,528 B2).

Regarding claim 7, the modified device of Kim and Tziviskos differs from the claimed invention in that Kim and Tziviskos do not specifically teach that the optical communication device according to claim 3, wherein the bench is a ceramic bench.

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However using ceramic for an optical bench is well known in the art. For example, Galeotti teaches to use a ceramic bench in an opto-electronic device (column 8, lines 13-34). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to employ a ceramic bench, as it is used by Galeotti, in the device of Kim and Tziviskos in order to make a stable optical bench with high thermal conductivity.

5. Claims 31-35 and 60-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. Patent US 6,527,458 B2) in view of Tziviskos et al. (U.S. Patent US 6,411,854 B1) and further in view of Abe et al. (U.S. Patent US 6,565,267 B2).

Regarding claims 31 and 32, Kim further teaches that the optoelectronic elements on the bench include an optoelectronic chip for receiving light signals (fig. 3, PD 122), and the bench aligns the light guide to the optoelectronic chip (column 4, lines 54-64). The modified device of Kim and Tziviskos differs from the claimed invention in that Kim and Tziviskos do not specifically teach that an IC pre-amplifies signal of the optoelectronic chip. However, it is well known in the art to use an IC pre-amplifier to pre-amplify a signal from a PD chip. For example, Abe teaches to use an IC pre-amplifier (fig. 3A, IC 26) to pre-amplify a signal from a PD chip (fig. 3A, PD 22). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to employ an IC pre-amplifier to o pre-amplify a signal

from a PD chip, as it is taught by Abe, in the modified device of Kim and Tziviskos in order to increase the sensitivity of light detection.

Regarding claim 33, Kim further teaches that the light guide is an optical fiber and a ferrule supported on the bench (fig. 4, 144).

Regarding claim 34, the device of Kim differs from the claimed invention in that Kim does not specifically teach that the light guide is a waveguide made on the bench. However, Examiner takes Official Notice that it is well known in the art to use a waveguide made on a bench as a light guide. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to make a waveguide on the bench in the device of Kim to guide the light in order to simplify the assembly process of the device.

Regarding claim 35, Kim further teaches that the bench is a silicon bench (abstract). The device of Kim, Tziviskos, and Abe differs from the claimed invention in that Kim, Tziviskos, and Abe do not specifically teach that the bench is a single crystal silicon bench. However, examiner takes Official Notice that it is well known in the art to use a single crystal silicon for an optical bench. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use a single crystal silicon for the optical bench in the device of Kim, Tziviskos, and Abe in order to etch the bench to produce a V-shaped grooves for the light guide (column 6, lines 32-36).

Regarding claim 60, Kim further teaches two light guides (fig. 6A, 164) and two benches (fig. 6A, 162 and 163) are mounted on the circuit board (fig. 6A, 161), the

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optoelectronic elements on the benches include an laser diode (LD) chip for generating light signals, a monitoring photodiode (MPD) for monitoring the generated light, and a signal photodiode (PD) for receiving light signals and making photocurrent (fig. 4), a first bench aligns the laser diode (LD) chip to one of the light guides (fig. 4, 153), and a second bench aligns the signal photodiode (PD) chip to another light guide (fig. 4, 152). The modified device of Kim and Tziviskos differs from the claimed invention in that Kim and Tziviskos do not specifically teach that an IC pre-amplifies signal of the optoelectronic chip. However, it is well known in the art to use an IC pre-amplifier to pre-amplify a signal from a PD chip. For example, Abe teaches to use an IC pre-amplifier (fig. 3A, IC 26) to pre-amplify a signal from a PD chip (fig. 3A, PD 22). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to employ an IC pre-amplifier to o pre-amplify a signal from a PD chip, as it is taught by Abe, in the modified device of Kim and Tziviskos in order to increase the sensitivity of light detection.

Regarding claim 61, Kim further teaches that the optoelectronic chips mounted upon the benches are an laser diode (LD) and a monitoring photodiode (MPD) mounted upon one of the benches and a signal photodiode (PD) mounted upon the other bench, one light guide is coupled to the laser diode (LD), and the other light guide is coupled to the signal photodiode (PD) (figs. 4 and 6A).

Regarding claim 62, Kim further teaches that the light guide is an optical fiber and a ferrule supported on the bench (fig. 4, 144).



6. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. Patent US 6,527,458 B2) in view of Tziviskos et al. (U.S. Patent US 6,411,854 B1) and Abe et al. (U.S. Patent US 6,565,267 B2) and further in view of Galeotti et al. (U.S. Patent US 6,712,528 B2).

Regarding claim 36, the modified device of Kim, Tziviskos, and Abe differs from the claimed invention in that Kim, Tziviskos, and Abe do not specifically teach that the optical communication device according to claim 32, wherein the bench is a ceramic bench. However using ceramic for an optical bench is well known in the art. For example, Galeotti teaches to use a ceramic bench in an opto-electronic device (column 8, lines 13-34). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to employ a ceramic bench, as it is used by Galeotti, in the device of Kim, Tziviskos, and Abe in order to make a stable optical bench with high thermal electrically.

#### ***Allowable Subject Matter***

7. Claims 8-14, 37-43, 63-65, and 67-69 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

Claims 8-14 are allowable since the prior art of record does not teach or suggest in combination that the electronic elements mounted upon the bottom surface of the

circuit board are an auto power controlling (APC) IC for controlling the power of the laser diode in accordance with the power sensed by the monitoring photodiode, in addition to other limitations cited in the claims.

Claims 37-43 are allowable since the prior art of record does not teach or suggest in combination that the electronic element laid upon the top surface of the circuit board is a main amplifier for amplifying current preamplified by the preamplifier IC, and the electronic elements mounted upon the bottom surface of the circuit board are one or more than one of a waveform-reforming IC, a timing-adjusting IC and a buffer IC, in addition to other limitations cited in the claims.

Claims 63-65 are allowable since the prior art of record does not teach or suggest in combination that the electronic elements laid upon the top surface of the circuit board are an LD-driving IC for amplifying transmitting electric signals and giving the amplified signal current to the laser diode (LD) and a main amplifier for amplifying preamplified current of the preamplifier IC, in addition to other limitations cited in the claims.

Claims 67-69 are allowable since the prior art of record does not teach or suggest in combination that a preamplifier IC chip mounted upon the second silicon bench for pre-amplifying the photocurrent of the PD chip, in addition to other limitations cited in the claims.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571)

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272-3114. The examiner can normally be reached on 9:00 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

qzw  
6/21/2005

  
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